

Merging Technologies to develop light weight, high throughput X-ray optics

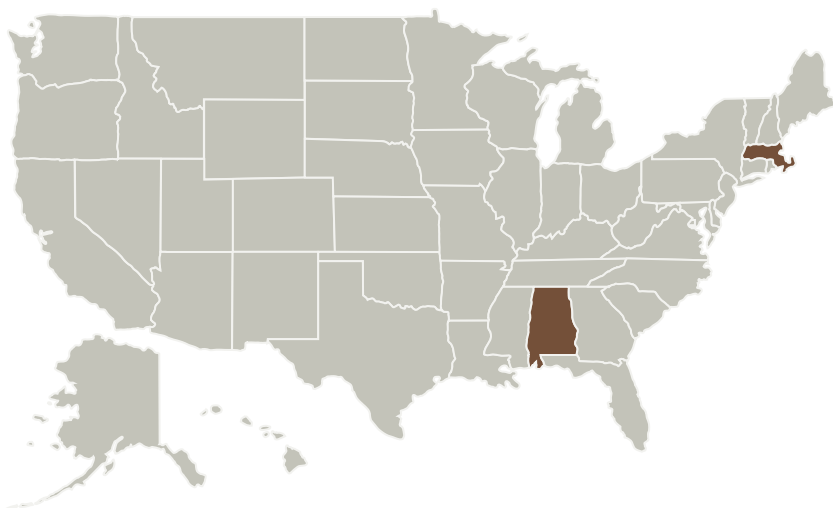
Completed Technology Project (2016 - 2019)



Project Introduction

X-ray astronomy is highly dependent upon focusing optics as illustrated by the profound influence that results from the Chandra, XMM-Newton, Suzaku and NuSTAR observatories are having upon astrophysics. Several future X-ray missions will require much larger area, and/or better angular resolution telescopes. However, they will face strict limits upon their mass and cost. Any innovation that can reduce the mass, lower the cost or improve the resolution of a telescope would be important as it would allow future missions to occur sooner and be more effective. Success in fabricating and testing new lighter weight, stronger material substrates will allow high throughput X-ray integral mirror shell telescopes like XMM-Newton to be substantially lighter weight, with improved angular resolution. The main objective of our program is to construct a lower mass telescope with better resolution than the replicated nickel telescopes currently being constructed. Our innovative approach merges the current electroforming technology with lower density materials which have higher stiffness, higher hardness and one-third the density of nickel. This will lead to lower mass, lower cost moderate-resolution-missions with higher effective area. Our goal is to demonstrate superior angular resolution for mirror shells that are lighter-weight than those currently fabricated by other integral shell replication methods. This technology will reinvigorate SMEX and MIDEX class options for X-ray astronomy, aiding the success of the Explorer program.

Primary U.S. Work Locations and Key Partners



Merging Technologies to develop light weight, high throughput X-ray optics

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	2
Target Destination	3

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Responsible Program:

Astrophysics Research and Analysis

Merging Technologies to develop light weight, high throughput X-ray optics

Completed Technology Project (2016 - 2019)



Organizations Performing Work	Role	Type	Location
Smithsonian Institution	Supporting Organization	Industry	Washington, District of Columbia

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Management

Program Director:

Michael A Garcia

Program Manager:

Dominic J Benford

Principal Investigator:

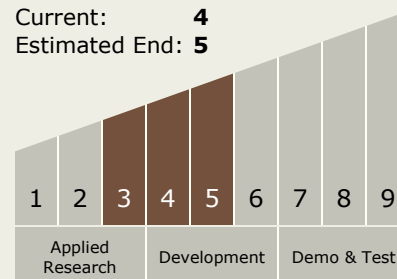
Suzanne E Romaine

Co-Investigators:

Brian D Ramsey
Ricardo J Bruni
Martin Elvis
Michael Griffith

Technology Maturity (TRL)

Start: 3
Current: 4
Estimated End: 5



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.2 Observatories
 - TX08.2.1 Mirror Systems

Merging Technologies to develop light weight, high throughput X-ray optics

Completed Technology Project (2016 - 2019)



Target Destination

Outside the Solar System